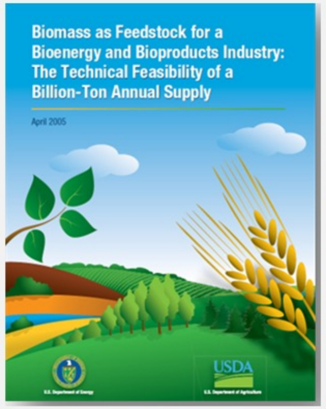
2023 Billion-ton Report, in Preparation

To inform research, development, and deployment strategies.

- Policy agnostic
- End-use agnostic
- Not predictions
- Not targets

2005



Supply…

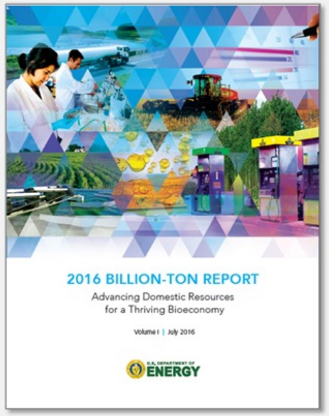
Can we displace 30% of the country's petroleum consumption?

2011

…Cost…

- County-level supplies by cost.
- Economic model of ag+energy crops.

2016 (BT16)



…Sustainability.

- 44 feedstocks w/ modeled crop yields
- Forest model
- Delivered costs
- 2 Volumes + visualization tools

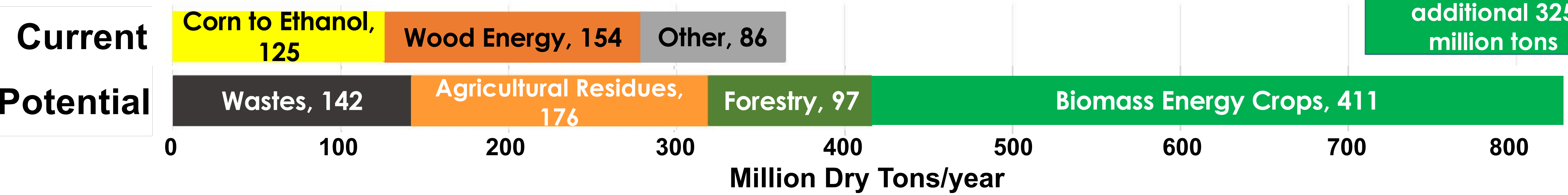
2023 (BT23)

Add new feedstocks
Update waste and algae
Refine forest resources

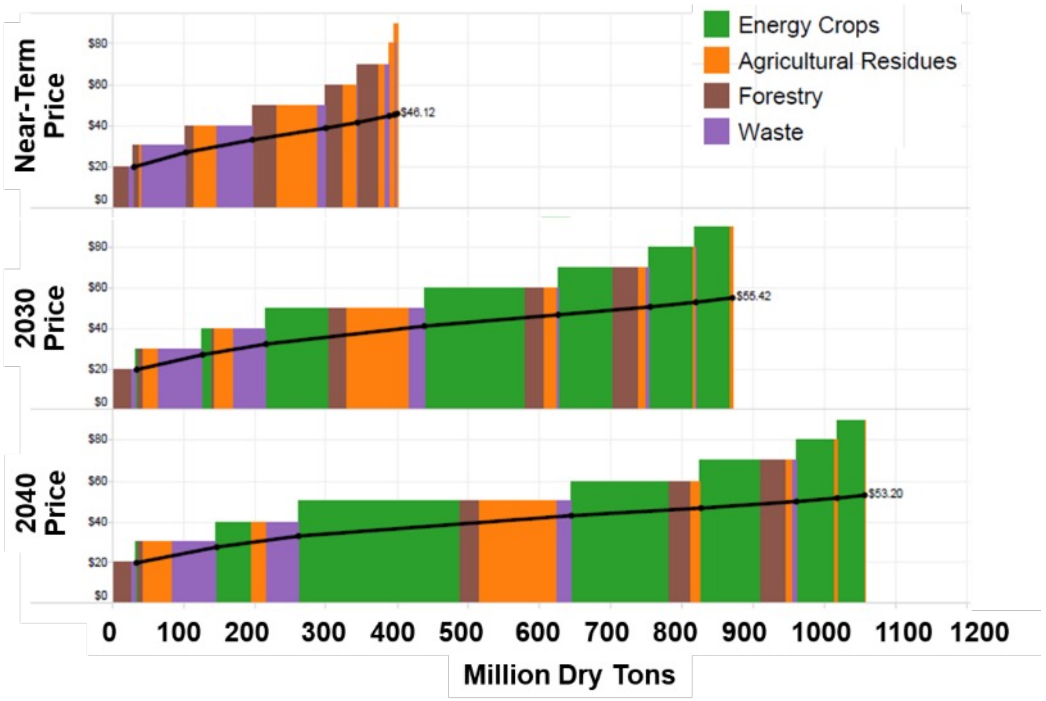
BT16 Summary, RFP implications

Conclusion: can ~triple current bioeconomy to ~1 billion tons per year

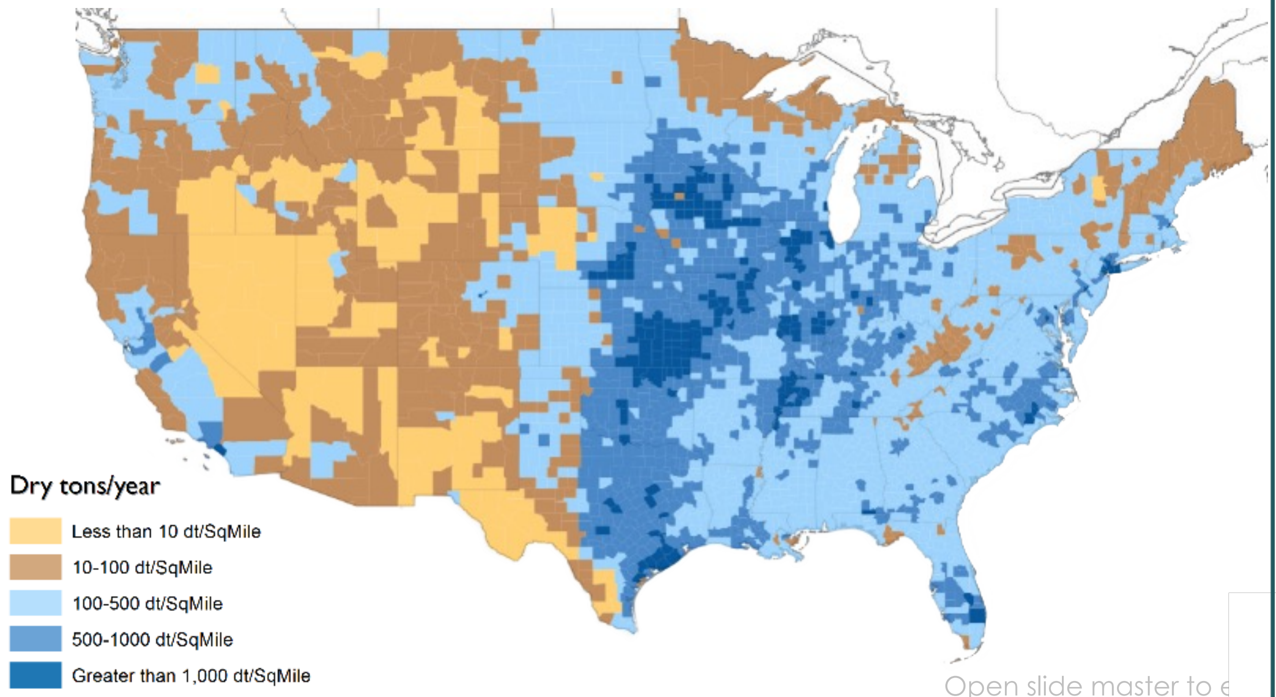
High-yield biomass crop scenario: additional 325 million tons



Supply varies with price and time



County-level results downloadable



BT23 – RFP yield input to ag resource modeling

Resource

Crop residues

Switchgrass

Willow

Oil seeds

NEW!

Analysis

Model: Policy Analysis Systen (POLYSYS)

Inputs:

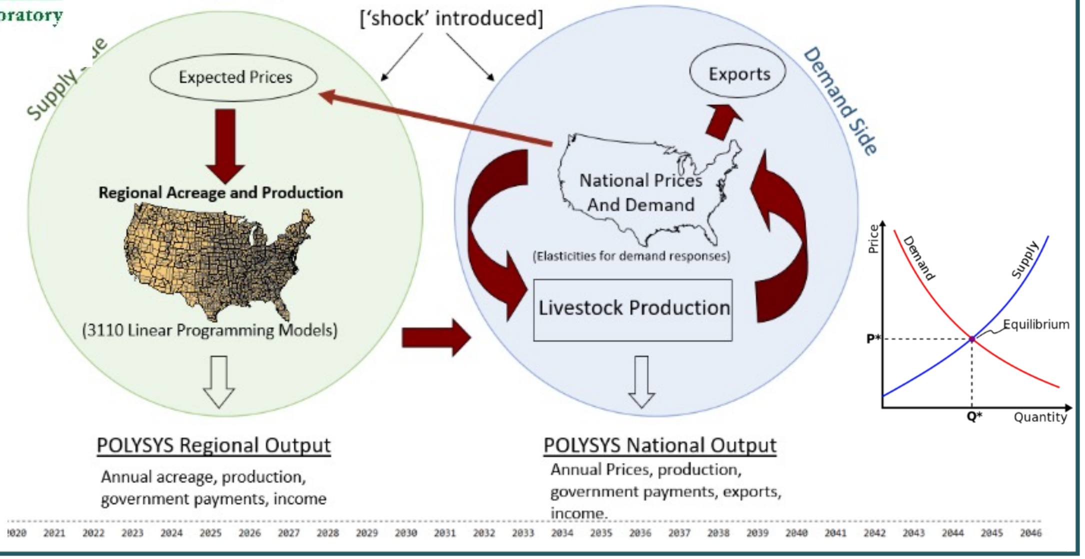
- Conventional (food, feed, fiber, export) demands from 2023 USDA Baseline Projection
- Crop yields (tons/acre/year) from SunGrant Regional Feedstock Partnership
- Crop production budgets from surveys
- 30-meter resolution (2022 Cropland Data Layer)

NEW!

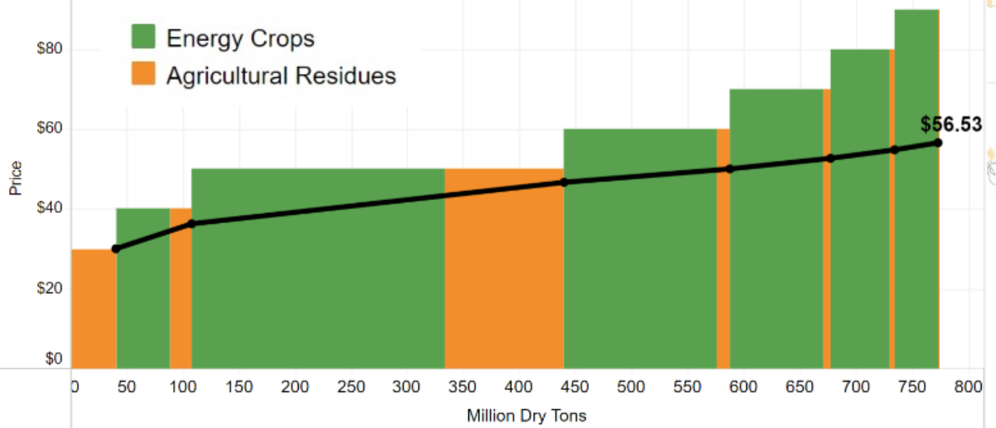
Oak Ridge National Laboratory

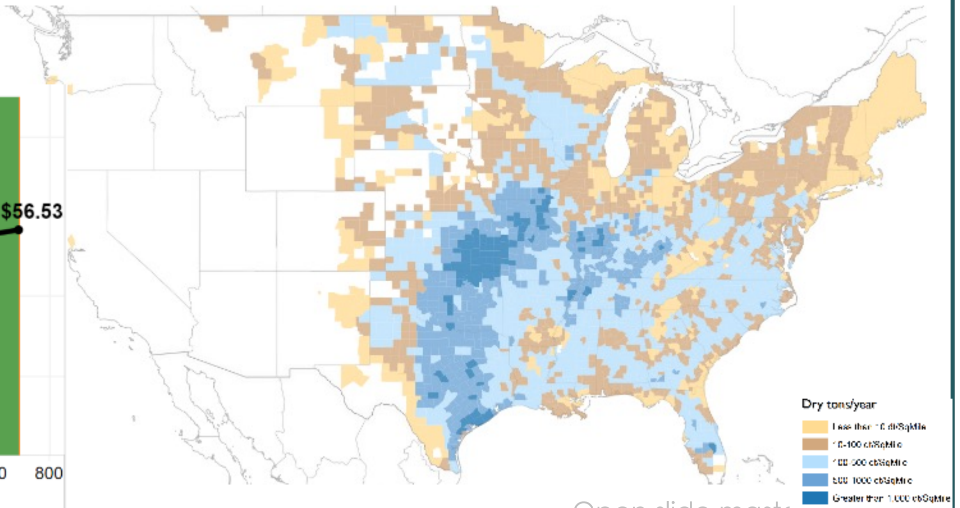
| CORN SUPPLY AND USE, 2019-2046 Start with USDA Baseline

Item	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Planted	89.9	94.5	89.0	89.0	89.0	89.0	89.0	89.0	88.5	88.5	88.5	88.4	87.3
Harvested	81.8	87.1	81.6	81.6	81.6	81.6	81.6	81.6	81.1	81.1	81.1	81.0	80.0
Yield(Bu/Ac)	168.4	178.5	180.5	182.5	184.5	186.5	188.5	190.5	192.5	194.5	196.5	197.5	198.5
Season Average Price	3.80	3.40	3.40	3.45	3.45	3.50	3.55	3.55	3.60	3.60	3.60	3.48	3.49
Net Retns(Value-Expns)	23186	22299	21244	22669	23024	24091	25042	25572	26639	27245	27810	26117	26273



Outputs: County-level supply curves

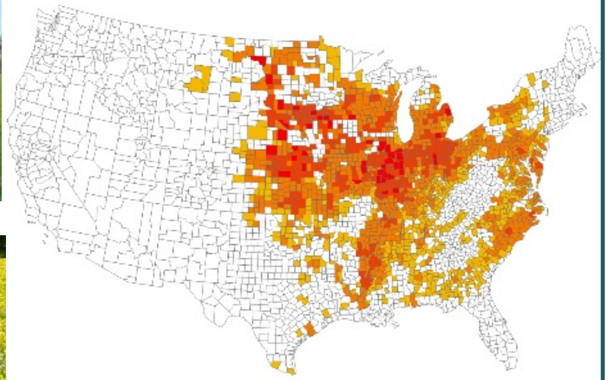




NEW in BT23

NEW!

Oilseed crops for SAFs



Macro- ("seaweed" algae)

- Collaboration with ARPA-E

OceanReports
A BOEM/NOAA PARTNERSHIP

MarineCadastre.gov

Western Forest Fuels for biomass with USFS

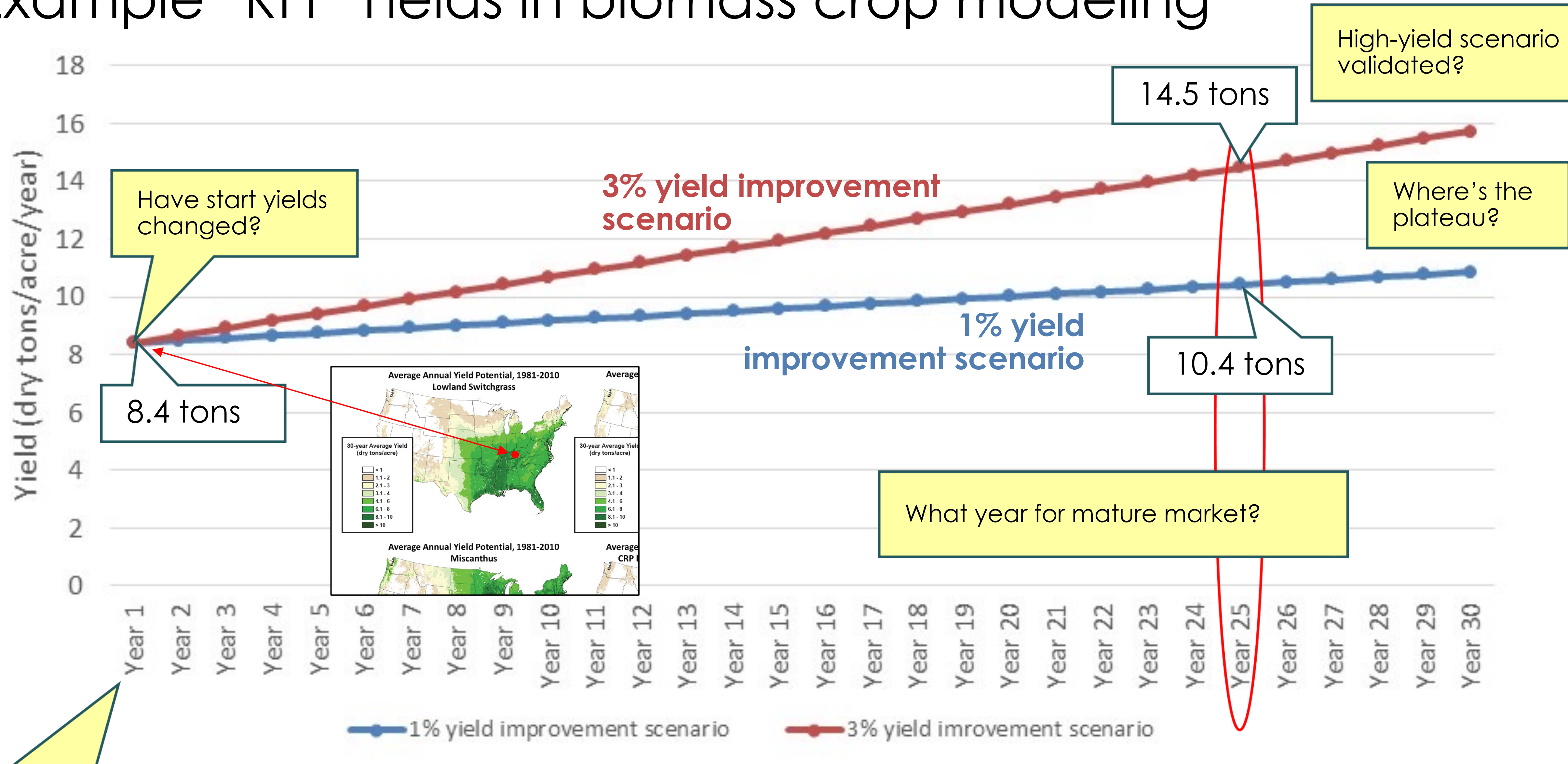
- Biomass from 2022 USFS Wildfire Crisis Strategy


USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE
FS-1187a | January 2022
WILDFIRE CRISIS
strategy

CO_2 to e-fuels

- Proximity to renewable electricity
- High concentration (e.g. fermentation)

Example* RFP Yields in biomass crop modeling



Do rates of improvement vary by start yield?

*Example from Crittenden County, KY

Assumptions matter

Yield assumptions:

Modeling and Analysis

Biofpr Biofuels Bioproducts & Biorefining

The impact of alternative land and yield assumptions in herbaceous biomass supply modeling: one-size-fits-all resource assessment?

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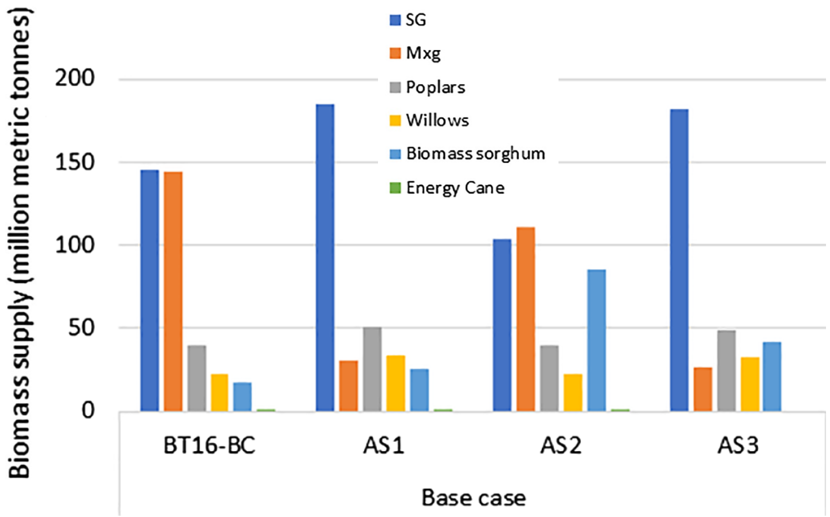
Received December 19, 2017; revised October 2, 2018; accepted October 2, 2018
View online at Wiley Online Library (wileyonlinelibrary.com);
DOI: 10.1002/bbb.1946; *Biofuels, Bioprod. Bioref.* (2018)

Abstract. The Billion-ton Reports series has addressed the technical economic potential of supplying additional biomass from farmland and forests.[1–3] Underlying each of the reports and supporting scenarios is a series of assumptions that drive the modeled output. The assumptions have developed over time with the support of technical experts from industry, academia, and government.[4] Energy crops have not yet reached commodity scale, and only exist in commercial production in a limited number



Market assumptions:

Original Article

Biofpr Biofuels Bioproducts & Biorefining

Supply analysis of preferential market incentive for energy crops

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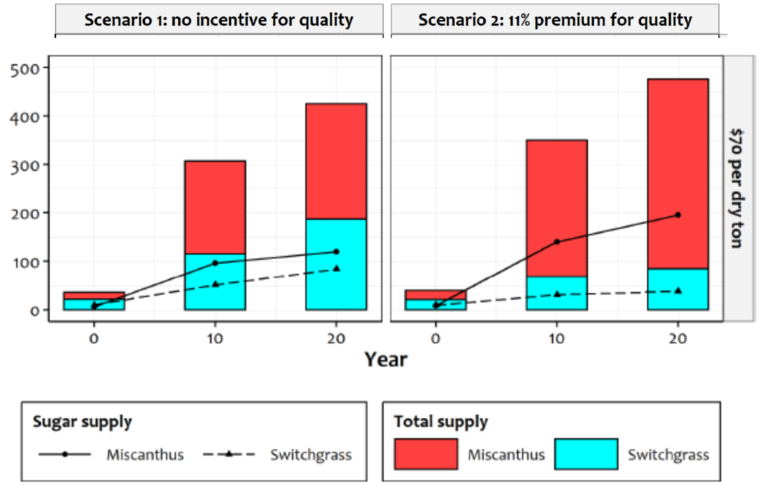
Received July 9 2020; Revised December 8 2020; Accepted December 11 2020;
View online at Wiley Online Library (wileyonlinelibrary.com);
DOI: 10.1002/bbb.2184; *Biofuels, Bioprod. Bioref.* (2021)

Abstract: This analysis explores the valuation of feedstock quality attributes of switchgrass and miscanthus – two energy crops poised for future expansion – and compares the relative economic availability of these two crops under two scenarios: (i) uniform price assumptions (i.e., no incentive for quality), and (ii) a scenario of a price premium based on convertibility (i.e., an incentive for quality). Given data on cellulose content, hemicellulose content, and their relative convertibility, miscanthus is expected to be 11% more efficient at conversion to biofuels than switchgrass under the biochemical conversion route. Based on this scenario of improved conversion efficiency and associated profit, we simulate an 11% price premium for miscanthus over other feedstocks in a base-case scenario. By adding this price premium, supplies of miscanthus increase over the base case by about 4 million (44%), 94 million (64%), and 166 million (94%) tons in year 0, 10, and 20 after simulated contracts for production are



Climate change: